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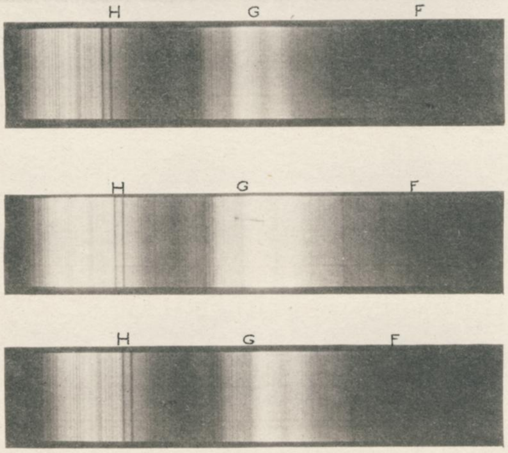
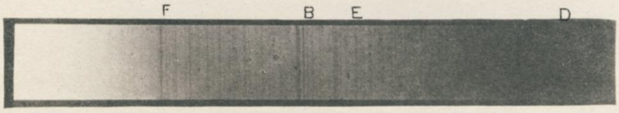
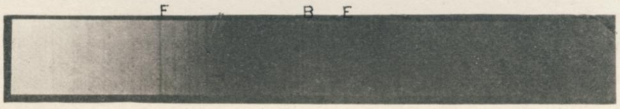
SLIT $\frac{1}{100}$ OF INCH WIDE.



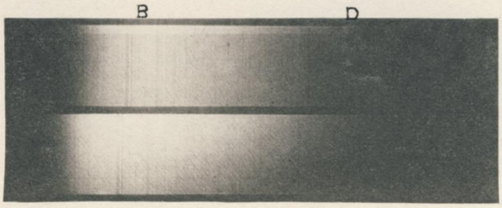
ABSORPTION BANDS OF URANIUM ACETATE SOLUTION.



ABSORPTION BANDS OF CHLOROPHYLL SOLUTION.

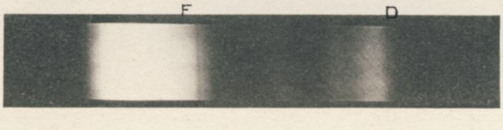


SOLAR SPECTRUM.

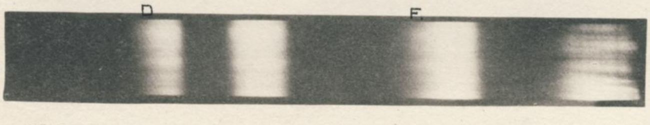


SOLAR SPECTRUM.

SLIT $\frac{1}{50}$ OF INCH WIDE



ABSORPTION BANDS OF CHLOROPHYLL SOLUTION.



ABSORPTION BANDS OF SOLUTION OF PROTO-CHLORIDE OF URANIUM

HELIOTYPE

XXII.

ON PHOTOGRAPHS OF THE SOLAR SPECTRUM.

By Robert Amory, M.D.

Read, May 10, 1876.

In continuation of the experiments first presented to the Academy a year ago concerning the photography of absorption bands from light transmitted through colored solutions, I take pleasure in announcing, that owing in great part to the assiduous application of my assistant, Mr. J. H. Hubbard, the lines between F and D of the solar spectrum have been distinctly impressed upon a sensitized collodion plate. The plate I now present to the Academy shows these lines unmistakably, the double line of D being perfectly visible. The image is impressed upon that kind of collodion which is coated upon what are known as the " Stuart-Wortley Plates."

I believe this is the first time that a sharp photographic image of the D line has ever been exhibited; though I am well aware that others have reported that they have been able to obtain photographic effects from the yellow and red rays of the spectrum.

You are probably aware that these are dried plates; and in addition to the advantage of using a dry plate, in which the decomposition may be supposed to continue more favorably than on a wet plate, which is constantly drying up when exposed, mention may be made of the probable ingredients used in the dry process. These consist of bromide of silver, salicine, and uranium, among others; and it was evident to us, from certain of our preliminary experiments, that the glucosides, added to collodion, increased the sensitiveness of the plates exposed to the green rays. Hence we were induced to use these in preference to the ordinary dry tannin plates. An exposure of thirty to forty-five minutes is required in order to obtain a distinct image of the solar lines in that portion of the spectrum which I have here presented.

You will observe that the image is brought to a principal focus in the vicinity of E and b lines; in fact, that eight of the group of E lines are quite easily made out, especially if viewed through a magnifying lens of low power. It may also be noticed that the two lines of D are quite sharp, and distinctly visible: possibly the positive impression taken from the same negative, which is here exhibited, may make these lines more visible in the dazzling gaslight of this room. I also present negatives and their positives of the absorption bands of a solution of uranium acetate, of uranium chloride, and also of a solution of chlorophyll, the latter of two kinds, one of which is obtained from grass, and the other from green tops of the asparagus-plant.

In conclusion, I will state that we have used the most simple apparatus that could be devised, so that we may only lose a small portion of light, and not complicate the results by too many reflections of the image submitted to the photographic action. This apparatus consists, 1st, of the heliostat; 2d, a mirror arranged in the central axis of the heliostat to intercept and reflect the beam into a dark room; 3d, a slit (width about one-hundredth of an inch) in the shutter of the dark room; 4th, a collimating lens at its exact focal distance from the slit; 5th, a dense glass prism arranged at the minimum angle of deviation for the especial line whose image we wish to photograph; 6th, a common spectacle lens of forty-two-inches focus; 7th, the sensitized plate. Between the prism and the sensitized plate, a square, dark box of large capacity excludes all other light than that we wish to use.

On the following page will be seen heliotype prints of these bands, though it should be borne in mind that it is almost impossible to obtain an exact reproduction of details in a positive on paper, unless the negative be retouched, which for obvious reasons cannot be allowed. Mr. E. Edwards very obligingly has devoted much pains to the reproduction of these prints by the heliotype process.